

Effectiveness of Jalaukavacaraṇa (Leech Therapy) in Acute Inflammatory Joint Disorders.

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ABSTRACT

Leech therapy is one of the modalities of asastrakṛta raktamokṣaṇa karma (bloodletting without sharp instruments) for treating localized pain. Acharya Susruta mentioned it in pittaduṣṭarakta (blood vitiated by pitta), avagaḍhaduṣṭapittavyadhi (deep seated vitiated pitta disease), toda (pain), etc. Traditionally in practice it is elicited that it effectively alleviates pain and relieves joint inflammation rapidly and improves joint functions as well. A retrospective survey done in KLE University's Sri BMK Ayurved Hospital & Research Centre revealed IPD and OPD units were frequented most by asthi-sandhigatavata (joint conditions). Since studies have also shown salivary glands of leeches also produce pharmacologically active substances including antihistaminic, protease, and anesthetic, antitripsic molecules. An open non-randomized trial was carried out on patients diagnosed with sandhi-asthigatavata (osteo-arthritis, synovitis, and bursitis) and snayugatavata (tendinitis) following application of Jaluka/leech. The findings of the study suggested that acute conditions of these afore mentioned conditions in terms of pain was alleviated following the course of treatment.

(Keywords: leech, tendinitis, synovitis, osteoarthritis ayurvedic medicine)

INTRODUCTION

Musculoskeletal pain from overuse affects 33% of adults and accounts for 29% of lost workdays due to illness as per the International Association for Study of Pain (IASP). While incidence rates for overexertion injury due to lifting are 1.3 times

greater in males, rates are higher in females for the following conditions: 3.0 times greater for carpal tunnel syndrome, 2.3 times greater for tendinitis, and 2.0 times greater for injuries caused by repetitive motion. Medical science has enormous leaps in terms of diagnosis and treatment yet there is renewed interest in leech therapy among modern as well as traditional medicine practitioners.

Most of the studies on leech therapy are found for plastic surgery and pain reduction in osteoarthritis. The bite of a leech is actually painless. All ancient civilizations practiced bloodletting including Indian and Greek civilizations. The use of leeches in modern medicine made its comeback in the 1980s after years of decline, with the advent of microsurgery such as plastic and reconstructive surgeries. Acharya Susruta mentions leech therapy as a mainstay in pancakarma and is aimed at blood vitiated by pitta, deep seated vitiated pitta disease, pain, etc. [1].

References regarding the eradication of the disease from uṣina is mentioned in R̥gveda. This process mainly refers to blood-letting. The method of application of leech for raktamokṣana/ blood-letting is mentioned in Kausika Sutra 4/26/8 which is a synopsis of Atharvaveda. Acharya Charaka has enumerated blood related disorders and their treatment by various types of blood letting [4]. Acharya Susruta has dealt in detail with blood-letting and its type [3]. In the present era, leeches have become the cynosure for the researches all over the world. Over 100 chemicals are believed to be present in leech saliva of which about fourteen have been isolated and studied. It is proved to be used to treat post

phlebitis syndrome in which venous valves are obliterated by deep vein thrombosis. Recent studies have shown its dramatic effect in relieving symptoms of osteoarthritis. Keeping this in mind a pilot trial was undertaken to assess the said benefits of leech therapy in inflammatory joint and musculoskeletal conditions, in alleviating the symptoms and also to evaluate its efficacy in the same condition necessitating further approach.

AIMS AND OBJECTIVES

1. To clinically evaluate the effectiveness of leech therapy in inflammatory musculoskeletal conditions.
2. To understand its significance in reducing pain and associated symptoms.

INCLUSION CRITERIA

- Consented patients with confirmed diagnosis of osteoarthritis, tendinitis, bursitis.
- Diabetic individuals on medications and under control.
- Patients with history of essential hypertension on medication.

EXCLUSION CRITERIA

- Infections.
- Existing ulcers, non-healing ulcers.
- Wounds.
- Exclusion of nonsteroidal anti-inflammatory drugs.

MATERIALS AND METHODS

Study Methodology

- An open non-randomized study.
- Place - IPD and OPD subjects from the Department of Panchakarma, Sri BMK Ayurved Hospital & Research Centre.
- Two leeches were applied topically at painful peri-articular sites on the affected area.

Intervention

A single trial of two leeches (*Hirudo medicinalis*) applied topically at painful periarticular sites of the knee joint in the experimental group of 4 patients. They received conventional ayurvedic treatment (kaishora guggulu, mahamajishthadi kaşayam) for pain during the course of treatment and following it as well.

Duration of application – 40 min to 1hr

2nd application – On 3rd day

Study group – Patients with a confirmed diagnosis of osteoarthritis, bursitis, tendinitis.

Duration with follow up – 2 months

A pre-operative & post-operative procedure of blood-letting by application leech was followed.

Hematological investigation clotting time, bleeding time, etc., within normal limits.

Research Protocol

The research protocol reviewed and approved by institutional ethics committee, included 2 sittings, follow up on 15th day and at the end of 2 months. The patients fulfilling the diagnostic criteria were selected for the study and interviewed thoroughly along with their family members and/or relative to obtain detailed information about the patient as well as the disease and collected in different data as follows:

The patients registered for the clinical study were on Ayurvedic medicine internally which included kaishora guggulu and mahamanjishthadi kaşayam. Each patient advised routine investigation including CBC, RBS, LFT, blood urea, serum creatinine, BT, CT, HIV 1 and 2 before the leech therapy. X-Ray of the involved joint is also done to diagnose the disease.

Leech therapy /Jalūkāvacharana

Out of 12, only 6 varieties of non-poisonous leeches are used for medicinal purpose. The sankumukhi type of leech is preferably used for medicinal purposes due to its rapid blood sucking capacity.

As per classical description of Ayurveda, the leech neither too long, nor too small should be preferred for therapeutic purposes [2].

The leech should be stored in a well-labeled container having multiple pores on the top for proper aeration. The temperature should be maintained around 5-27°C (40-80°F). The water of the container should be de-chlorinated and should be replaced after 5-6 days. About 50 leeches can be kept in one gallon (4 l) of water. If it is not possible to get the de-chlorinated water, then keep the container of chlorinated water open in the air for a period of time and then use it for storage of leech. It is better to avoid direct exposure of sunlight to the leeches.

Method of Application [3]

Pre-procedure/Purva karma: Purification of leech by pouring the leech in water mixed with turmeric powder.

Part preparation: cleaning of the part of the body was done with normal saline and dried; to which leech was to be applied.

Procedure/Pradhana karma: Before application the skin was pricked with a sharp and sterile needle such that the drop of blood came out. Then the leech was applied through its front end towards the affected part and when it acquires a horse shoe shape along with signs of active peristalsis the leech was covered by wet cotton. If the leech is not ready to suck the blood from the body part, then application of madhu/honey, ghrita/clarified butter was done.

Observation of leech: Gradual distension in the central portion of the body. Itching and burning sensation at the site of bite. Pulsations on the body of leech was visible.

Removal of leech: After 45-60 minutes the leech detached by itself or by application of turmeric powder on the mouth of leech.

Post-procedure/Paschata karma:

Care of wound: After detachment of leech there was a triangular wound created by the mouth of the leech. The blood came out from the wound. The bleeding from wound was checked by application of yastimadhu (*Glycirizza glabra*) or turmeric (*Curcuma longa*) powder.

Induction of emesis: The leech that was applied to the lesion underwent the process of vama (emesis) so that the same leech could be applied next time to the same patient. For the emesis of leech turmeric powder was applied over the mouth of the leech. Sometimes pressing of the leech from caudal to front-end was required for proper emesis. After proper emesis leeches were put in fresh water, where it swam swiftly and then settled down. The leech was replaced in a clean jar or aquarium.

Contra Indication of Leech Therapy [3]

- Blood clotting disorder
- Severe anemia.
- Allergic reaction to active substances of the leech such as hirudin, calin, hyaluronidase, eglina, kollagenage, apyrase, destabilase, piyavit, etc.
- Asthenic individuals
- Pregnancy

Precautions During Leech Application

- Bleeding and clotting time of the patient should be normal.
- Gentle handling of the leech.
- Cover the leech with wet cotton.
- Frequency of leech application

The frequency of leech application will vary according to the disease and severity. Generally leech should be applied once in a week up to six sittings. One leech should be reserved for a particular patient to avoid cross infection.

CRITERIA OF ASSESSMENT OF RESULTS

To assess the efficacy of the therapy objectively, all the signs and symptoms were given score depending upon their severity. Gradation of signs and symptoms were as following:

Pain

Gradation of pain by visual analogue scale

- 0-1 – no pain
- 2-3 – mild pain
- 4-5 – uncomfortable
- 6-7 – distressing
- 8-9 – intense
- 10 – worst possible

Swelling

- 0 – nil
- 1 – Mild tenderness, causing patient to wince on digital pressure
- 2 – Moderate tenderness, causing patient to wince on withdrawal of digital pressure
- 3 – Severe tenderness, patient hesitant to touch and temperature variation

Stiffness

- 0 – nil
- 1 – mild
- 2 – moderate
- 3 – severe

ARA Joint Count

The number of clinically active joints is determined on the basis of tenderness on pressure or pain on passive movement.

Following joints to be examined – elbow, wrist, hip, knee, ankle, tarsal, temporomandibular joints of cervical spine, sternoclavicular joint, metatarsophalangeal joint, interphalangeal joint

Restriction of Movement

- 0 – absence of movement
- 1 - < 25% restriction of movement
- 2 – 25-50% restriction of movement
- 3 - >50% restriction of movement

Subjective - Visual Analog Scale		
Patient No.	Before treatment	After treatment
1	5	2
2	8	3
3	7	3
4	6	4

Objective	
Flexion- Percentage of reduction	Extension - percentage of reduction
40%	20%
60%	40%
40%	10%
50%	20%

Symptoms	Mean±SD		Paired t- Test
	Before leech therapy	After leech therapy	
Pain	6.47±0.93	2.14±0.66	4.32±1.07, t=23.67, p<0.001
Swelling	2.15±0.56	0.65±0.60	1.50±0.50, t=17.23, p<0.001
Stiffness	1.68±0.68	0.15±0.36	1.53±0.70, t=12.62, p<0.001
RA Index	2.26±0.45	0.56±0.50	1.50±0.50, t=12.62, p<0.001
ARA joint count	3.19±0.78	1.44±0.56	1.75±0.76, t=12.99, p<0.001
Restriction of movement	2.21±0.41	0.56±0.50	1.65±0.69, t=13.90, p<0.001

RESULTS

Main outcome measures include self-reported localized pain, assessed by subjective and objective parameters for the days of treatment and follow-up after 15 days.

Application of leeches led to rapid relief of pain with sustained improvement after 2 months in the absence of major complications.

DISCUSSION

The ancient authors *Charaka* and *Sushruta* treated successfully many incurable wounds and other medical conditions such as *Kustha*, *Switra*, *Vatarakta*, *Sandhigatavata*, etc., by the application of leeches. Since long-term therapy for osteoarthritis of the knee has limited options and treatment carries substantial risk for serious adverse effects [9] new therapeutic approaches should be considered.

Leech therapy, although extensively used for treating pain throughout the medical history has never been evaluated in a modern scientific context [10] these injuries include a variety of disorders that cause pain in bones, joints, muscles, or surrounding structures. The pain can be acute or chronic, focal or diffuse. The pathophysiology of musculoskeletal pain related to joints is not completely clear, but inflammation, fibrosis, tissue degradation, neurotransmitters, and neurosensory disturbances have been implicated.

Injury induces increased pro-inflammatory cytokines and mediators in affected tissues and systemically. This increase leads to peripheral nociceptor sensitization. Increased inflammatory mediators induce increases in matrix metalloproteinases (enzymes that degrade extracellular matrices), lowering tissue load tolerance and leading to further injury and more pain. Neurosensory/neuroimmune factors as in hypersensitivity, with increased levels of neurotransmitters, inflammatory mediators and cytokines, causes peripheral nociceptor sensitization or central amplification of pain.

Acharya Vagbhaṭa has opined the necessity of letting blood in painful conditions of the joints where all signs of inflammation are appreciated. These pitta and rakta dominant conditions are to be tackled by applying leech which are by nature

mild and have properties like moistness, sliminess, dampness, coldness. Their ability to suck the vitiated humors render them at prime position to tackle such inflammatory conditions of the musculoskeletal system. In turn the leech salivary enzyme contains active substances such as bdellins which are proven anti-inflammatory, histamine like vaso dilators, superoxide production and poorly characterized anesthetics and analgesic compounds.

These substances might reach the deeper tissue levels and possibly joint spaces. Various bioactive substances in leech saliva may also be as pharmacologically potent as hirudin and thus exert substantial effects in periarticular tissue and adjacent structures. It has been proven that through Laser Doppler Flowmetry that there is a significant increase in superficial skin perfusion following leech therapy especially 16mm around the biting zone [8]. Therefore a regional analgesic anti-phlogistic effect by these substances enforced by hyaluronidase, as well as counter irritation might be the possible reason for improvement following application of leech. Leech therapy could induce pain relief through antinociceptive effects and counter irritation. During inflammation, chemicals such as adenosine, prostaglandin (PG) E₁ and PGF_{2α}, leukotriene B₄ and (8R-15S)-dihydroxyeicoso-(5E-9,11,13Z)-tetraenoic acid (8R-15S-diHETE) are released within the joint, where they sensitize nerves, resulting in increased firing to a given stimulus [12]. At the same time, inflammatory mediators such as bradykinin, histamine, 5-HT, PGE₂, prostacyclin and acidosis stimulate nerves even in the absence of mechanical stimulation [11, 13].

Over a period of hours or days, recruitment of inflammatory cells and up-regulation of genes within the synovium generates cytokines such as IL-1, IL-6, IL-8 and TNF-α, in addition to nerve growth factor [13]. These factors further enhance peripheral sensitization, whilst neuronal plasticity contributes to central sensitization. By the practice of blood-letting by application of leech in these inflammatory conditions of the joints the pathway of inflammation and thereby pain stimuli seem to be receded.

CONCLUSION

Leech therapy may be an effective treatment for rapid reduction of pain associated with conditions

of deep seated vitiated humors which present as inflammatory conditions of the joints. Its efficacy should be tested in larger randomized controlled trials with assessment of expectation bias.

REFERENCES

1. Vaidya Jadavji Trikamji Acharya (editor). 1980. *Sushrutasamhita by Sushruta with Nibandhasangraha commentary of Dalhanacharya. Fourth Edition.* pg 379, Shareera sthana 8th chapter, verse 4. Krishnadas Academy, Chowkhamba Press: Varnasi, India.
2. BHP Vaidya (editor). Vollated by Late Dr. Anna Moreswar Kunte and Krsna RamchandraSastri. Introduction by PV Sharma Astangahrdayam. Composed by Vāgbhaṭa with commentaries of Arunadatta and Hemadri. 2005. *Sutrasthana.* 9th Edition. 26th chapter, verse 28, pg670, Chaukhambhaorientalia: Varnasi, India.
3. Vaidya Jadavji Trikamji Acharya (editor). 1960. *Sushruta samhita by Sushruta with Nibandhasangraha commentary of Dalhanacharya.* Fourth Edition. pg 55, Sutrasthana13th chapter. Krishnadas Academy, Chowkhamba Press, Varnasi, India.
4. Vaidya Jadavji Trikamji Acharya (editor). 2000. *Charaka Samhita by Agnivesha revised by Caraka and Drdhabala with Ayurveda-Dipika commentary of Chakrapanidatta.* pg:680, Chikitsasthana 28th chapter, Krishnadas Academy, Chowkhamba Press, Varnasi, India.
5. Patil Vasant. 2011. *Principles & Practice of Panchakarm.* 2nd ed. Chapter15 ,pg 538. Atreya Ayurveda Publications: Ilkal, India.
6. Vd.Kasture. 2007. *Ayurvediya Panchakarma Vijnana.* 10th edition. Chapter 8, pg 504.
7. Dr. T.L. Devraj. 2004. *Panchakarma Treatment.* 2nd edition. pg 389.
8. Michalsen, A., S. Moebus, G. Spahn, T. Esch, J. Langhorst, and G.J. Dobos. 2002. "Leech Therapy for Symptomatic Treatment of Knee Osteoarthritis: Results and Implications of a Pilot Study". *Journal of Alternative and Therapeutic Health Medicine.* Sep-Oct. 8(5):84-8.
9. Singh Akhilesh Kumar, et al. 2011. "Analgesic and Anti-Inflammatory Activity of Leech Therapy in the Management of Arthritis". *Indian Journal of Research and Pharmacy.* 2(12):172-174.
10. Wolfe, M.M., D.R. Lichtenstein, and G. Singh. 1999. "Gastrointestinal Toxicity of Nonsteroidal

Anti-inflammatory Drugs". *New England Journal of Medicine.* 340:1888-99.

11. Sawyer, R.T. 1986. *Leech Biology and Behaviour.* Oxford University Press: Oxford, UK.
12. Perrot, S. and G. Guilbaud. 1996. "Pathophysiology of Joint Pain". *Journal of Rheumatology, England.* 63:485-92.
13. Konttinen, Y.T., P. Kemppinen, M. Segerberg, et al. 1994. "Peripheral and Spinal Neural Mechanisms in Arthritis, with Particular Reference to Treatment of Inflammation and Pain". *Arthritis Rheumatology Journal.* 37:965-82.
14. Kidd, B.L. and L.A. Urban. 2001. "Mechanisms of Inflammatory Pain". *British Journal of Anaesthesia.* 87:3-11.

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